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Application of Case Studies in Engineering Education: Selected Examples

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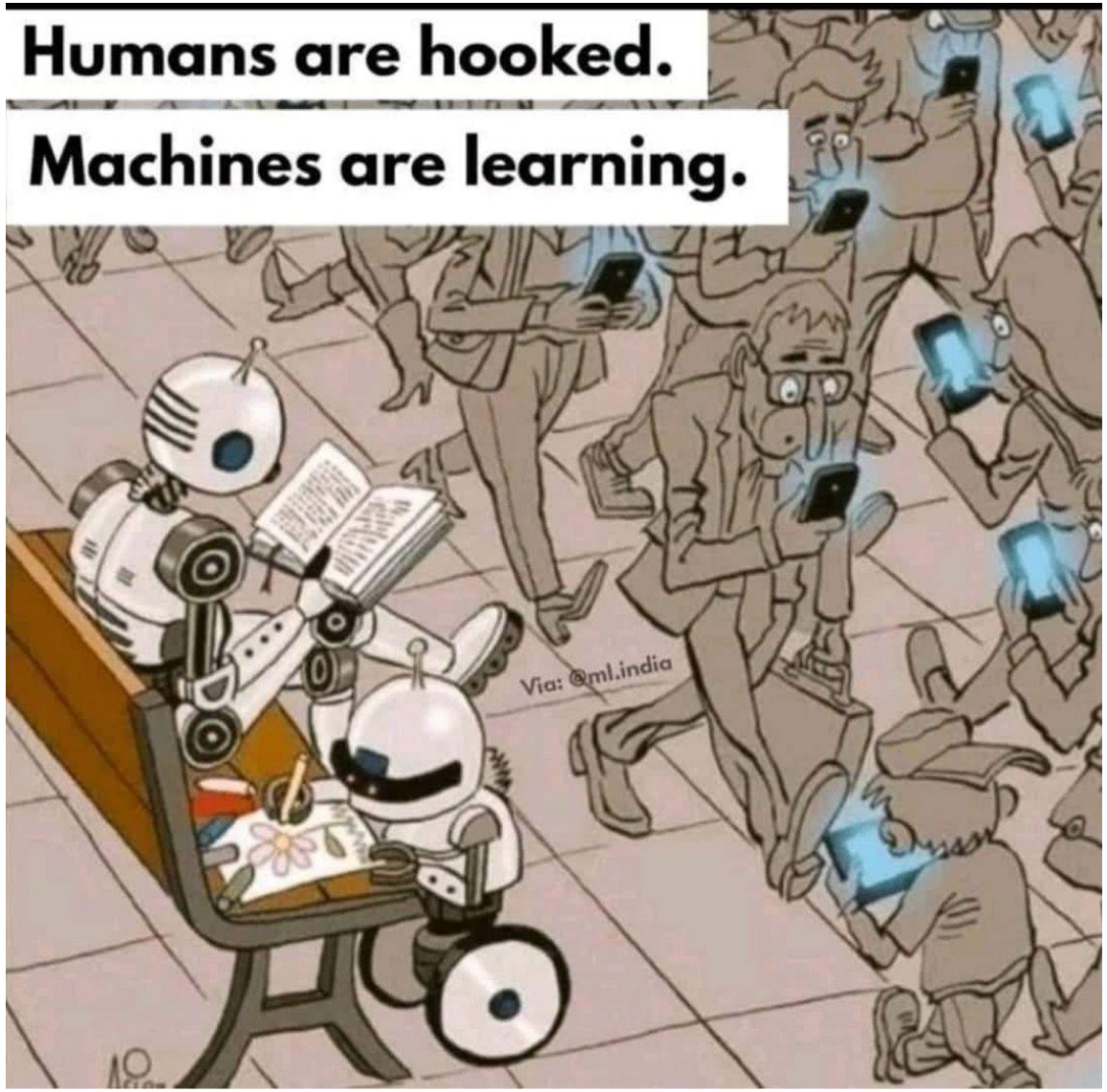
Presentation outline

- Background
- Case Study in Research and Teaching
- Case selection
- Report Writing and Presentation
- Assessment
- Conclusion



Background: SDG consideration in Mechatronics Curriculum

- #Envision2030 Goal 4: Quality Education
- Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

- Envision2030 Goal 9: Industry, Innovation and Infrastructure
- Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

- #Envision2030 Goal 12: Responsible Consumption and Production
- Goal 12: Ensure sustainable consumption and production patterns

- #Envision2030 Goal 17: Partnerships for the Goals
- Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Background

Course Title : Sustainable Development: Issues, Principles and Practices (UNGS 1201)

Synopsis

This course intends to increase students' knowledge of the concept of sustainability, and develop the right attitudes, values, and skills in addressing sustainable development issues and related challenges encountered in a globalized world. More specifically, this course aims to demonstrate the importance of sustainable development principles and practices and will also include an Islamic perspective on sustainable development. Through multiple case studies, students are expected to understand the challenges and barriers to integrating sustainable development at local, national, and international levels.

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Case Study in Research

- A case study is a detailed study of a specific subject, such as a person, group, place, event, organization, or phenomenon. Case studies are commonly used in social, educational, clinical, and business research.
- A case study research design usually involves qualitative methods, but quantitative methods are sometimes also used. Case studies are good for describing, comparing, evaluating and understanding different aspects of a research problem.
- Ref: https://www.scribbr.com/methodology/case-study/

Case Study in Teaching

Case studies are stories that are used as a teaching tool to show the application of a theory or concept to real situations. Dependent on the goal they are meant to fulfill, cases can be fact-driven and deductive where there is a correct answer, or they can be context driven where multiple solutions are possible. Various disciplines have employed case studies, including humanities, social sciences, sciences, engineering, law, business, and medicine. Good cases generally have the following features: they tell a good story, are recent, include dialogue, create empathy with the main characters, are relevant to the reader, serve a teaching function, require a dilemma to be solved, and have generality.

Ref: https://cft.vanderbilt.edu/guides-sub-pages/case-studies/

Case Selection

- Learning goals
- Learning activities
- Complexity of the scenario
- Students' prior knowledge
- Time frame

No.	Learning Outcomes	Bloom's Taxonomy		
		C	A	P
1)	Demonstrate the understanding and awareness of different concepts of sustainable development, and the importance to balance the perspective on economy, social and environment and integrate Islamic dimensions to the perspective.	C1, C2	A2	P1
2)	Collaboratively play the roles of member society to analyze challenges encountered by different societies in various development issues such as healthcare, education, social security, gaps between economic prosperity and environmental degradation.	C4	A2	P2
3)	To work together as member society to develop alternative and creative solutions to address the issues of sustainable development on campus community.	C4	A2, A3	P2

Case Selection

- Rehabilitation of Pusu River-
  -Syazana (KAED)- Syafiqah Zahid (KAED)- Farisha (IRKHS)-Alya(KICT)

- Flash floods in Selangor-
  - Puteri (IRKHS)- Batrisyia (KICT)-Hajar (KAED)- Syafiqah Shaari(KAED)

- Deforestation and biological loss in Sarawak-
  - Aini (IRKHS)- Syaimaa' (KAED)-Sofea (kaed)- Amirul (AIKOL) - Nik azfar (KOE)

- Sustainability Issues in Malaysian Palm Oil Industry-
  - Adib Azrai (KOE)- Hadi (IRKHS)-Ariff (IRKHS)-Hani (AIKOL)-Afif (KOE)

- Landslide in Cameron Highland-
  - Afiq (AIKOL)-Arfan (AIKOL)-Naim(KOE)-Danial (IRK)

Case Activities

In a multidisciplinary group students need to:

- Undertake Observation of Scenario
- Identify the elements in the scenario related to the Pillars of Sustainability
- Identify problems based on the study
- Propose solutions to the problems
- Submit a report
- Present the report

Individual Assessment

Q1. Identify the problems of the **Sungai Pusu** and then propose ***sustainable solutions*** to the problems of ***flash floods*** in the light of two tools of "***System thinking***". **(word limit 100 to 120** (**6 marks**)

Q2. Identify the problems of **landslides in Malaysia** and then propose ***sustainable solutions*** to the problems in the light of two tools of "***System thinking***". **(word limit 100 to 120) (6 marks)**

Q3. Give your opinion on how ***spirituality*** would be able to contribute to the ***sustainable development*** of the world ***(word limit 40 to 60 words)***. **(3 marks**)

ANALYSIS OF STUDENTS' RESULT

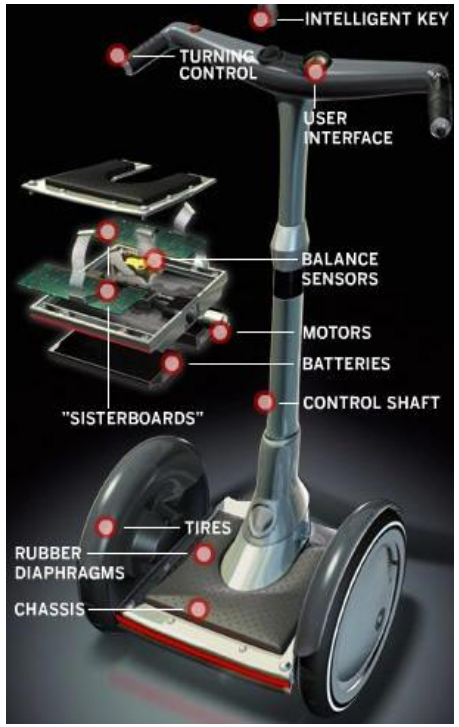
Course Code : UNGS 1201 Section : 16
SUSTAINABLE DEVELOPMENT: ISSUES, POLICIES AND PRACTICES

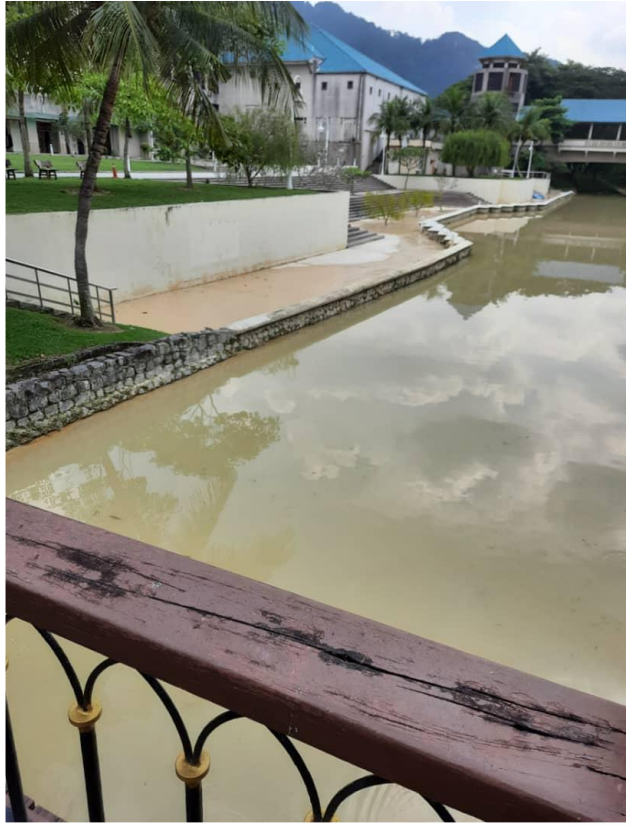
GRADE	NO OF STUDENTS	% BASED ON GRADE
A	14	38.89
A-	10	27.78
B+	6	16.67
B	2	5.56
B-	2	5.56
C+	0	.00
C	1	2.78
C-	0	.00
D	0	.00
D-	0	.00

GRADE	NO OF STUDENTS	% BASED ON GRADE
PASS	0	.00
AU	0	.00
I	0	.00
IP	0	.00
Total	36	

Conclusions

- Students actively participated in the case study activities
- Sustainability has been understood in terms of real context
- Group activities helped solve real-life problems
- Students understood their social responsibilities
- Performance was highly satisfactory
- Other courses are recommended to implement case study


INTELLIGENT KEY
TURNING CONTROL
USER INTERFACE
BALANCE SENSORS
MOTORS
BATTERIES
CONTROL SHAFT
"SISTERBOARDS"
TIRES
RUBBER DIAPHRAGMS
CHASSIS




Thank you!